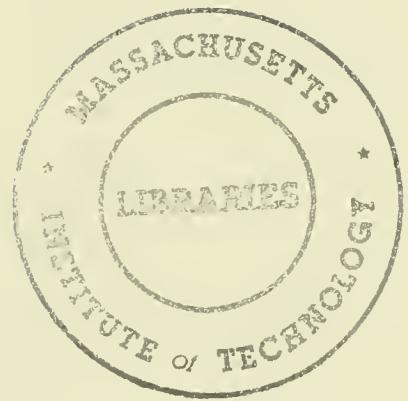


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PERSONNEL PLANNING IN THE U.S. AUTO INDUSTRY

by

Harry C. Katz and Ron Karl*
Sloan School of Management
Massachusetts Institute of Technology

WP 1424-83

April 1983

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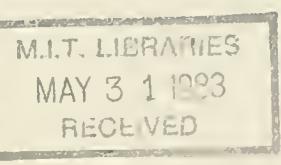
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Personnel Planning in the U.S. Auto Industry

Harry C. Katz and Ron Karl*

Sloan School of Management
M.I.T.
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*The authors are, respectively, Associate Professor and graduate student of the Sloan School. This research is part of a project funded by the European Economic Commission and directed by Wolfgang Streeck of the Science Center in Berlin, West Germany.



I. Introduction

This report analyzes how personnel planning, training, and adjustment occurs for blue collar workers within the U.S. auto industry. In general terms, the U.S. personnel system is heavily based on contractual agreements with the United Auto Workers (UAW). Cyclical flux in the sale and production of motor vehicles leads to overtime and layoff manpower adjustments which occur in accordance with contractual procedures. These procedures, in turn, rely heavily on seniority principles. The training of blue collar workers also takes place in the context of a contractually based system---an apprentice system that is associated with a sharp differentiation between skilled trades and production job classifications.

First, this paper provides an overview of the contractual rules which make up the auto personnel system. Two broad categories of rules can be distinguished---rules that relate to adjustments in response to cyclical flux, and rules concerned with training. The operation of these contractual rules is illustrated in Section 4 through discussion of a dispute concerning layoffs which arose within a General Motors plant. This case also highlights the operation of the training system within a given plant and illustrates the implementation issues which arise.

In the face of enormous declines in employment and heightened international competition, the U.S. auto collective bargaining system has begun to undergo significant transition. Some of the changes underway within the labor relations system are associated with efforts to lower costs while others are directly associated with new worker participation programs. Section 3 reviews how the training and personnel system is being affected by these changes. Here, our attention focuses on some new

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procedures introduced as part of the contracts signed at Ford and GM in the spring of 1982. These new contractual procedures include: a Guaranteed Income Stream Program; Pilot Employment Guarantees; and the creation of a National Employee Development and Training Program. As well, many changes underway at the shop floor level affect the training and personnel system. We draw on recent practices within the GM plant described in our case study, and on other field studies to illustrate these new shop floor practices.

Reference is made in our review of existing procedures to the contractual agreements at GM and Ford. It should be noted, however, that the procedures within these two companies are very similar and are also similar to the rules utilized within Chrysler and American Motors.

II. The Contractual and Procedural Rules

A. Adjustment in Response to Cyclical Flux

The U.S. auto industry has undergone large scale cyclical flux in sales and production over the post World War II period. A detailed contractual system has arisen to guide adjustments in employment and work hours in response to that cyclical flux. At the heart of the contractual system is a seniority-based layoff procedure which is associated with a supplementary unemployment benefit system. There are also contractual rules regulating overtime usage and allocation, and other aspects of human resource allocation.

Layoffs and associated "bumping rights" follow departmental seniority guided by a collection of job ladders which outline the departmental lines within a specific plant. The general outline of this

system is provided in each national company-UAW agreement while the specific layout of the job ladder is set in supplementary plant agreements.^{1/}

An important part of the layoff system, introduced in 1955 agreements and expanded in 1967, are the supplementary unemployment benefits (SUB) laid off workers receive in addition to state unemployment insurance benefits.^{2/} Companies contribute into an SUB fund on a per hour basis with a current contribution rate of roughly 30¢ per hour worked. SUB benefits, in combination with unemployment insurance benefits, can go as high as 95% of take home pay and as of the 1982 contract, workers can accumulate up to 104 weeks of SUB benefit entitlement. When the SUB fund level runs down (as during the 1980-83 period) benefit reductions adjusted for a worker's years of seniority are imposed. The SUB system also provides short work week benefits when work hours drop below 40. In practice, however, the use of layoffs and the payment of full layoff benefits overshadows the infrequent use of short week benefits. The fact that state unemployment insurance benefits typically are not available for part-time workers discourages the use of short work weeks. (Some states such as California recently have begun to experiment with the provision of unemployment insurance^{bands} to partially laid off workers).

Within the contractual system workers can use their seniority rights to bid on job openings that arise in other departments in the same plant. A history of grievance cases and arbitration awards has established the practice that seniority governs intra-plant transfer rights unless management can prove that another less senior worker has abilities "head and shoulders" above the more senior worker. In

practice, however, the head and shoulders criteria is rarely invoked as management finds it difficult to substantiate such claims and costly to adjudicate disputes.

Detailed contractual clauses also regulate the use of overtime. The current contractual language sets limits concerning the number of Saturdays any worker can be required to work, and gives workers the right to refuse some overtime work with advanced warning and with the promise that concerted action will not lead to the use of overtime refusal as a bargaining tactic.^{3/} There are also written rules regarding inter-plant transfer rights, the use of temporary part-time workers, probationary employee status, inverse seniority bidding for layoffs, shift assignments, and early retirement benefits. A more complete assessment of the personnel system would consider the impact of these and other contractual rules.

III. Training

There is a sharp differentiation within the blue collar job classification system between skilled trades and production classifications. Associated with this differentiation are the facts that trades workers receive significantly more pay (on average \$3.00 per hour more) and their duties are outlined in detail in the local agreements as part of efforts to maintain craft demarcation lines. At GM, trades workers were 20% of all blue collar workers in 1980. There are two routes by which a worker can attain "journeyman" trades (craft) status: through the formal four year apprenticeship program, or by working eight years on the job as an "employee-in-training."^{4/}

The apprenticeship program entails class work and on-the-job experience. The curriculum for this program is closely monitored by joint union-management national and plant committees. Meanwhile, the number of apprentices is regulated through contractual language stipulating that journeymen-apprentice ratios cannot exceed 1:5 (1:8 during specified exceptional conditions) as the union fears that apprentices earning a lower wage conceivably could be used as replacements for journeymen tradesmen. There is also a contractual stipulation that applications to the apprentice program be accepted on the basis that two applicants from the internal workforce be accepted for every one applicant from outside the company.^{5/} Although in practice, the percentage of external recruitment for the apprentice program is much below the allowed 33-1/3%, and has been dropping even lower (to one or two percent) in recent years in the face of the large layoffs of production workers and heightened pressure for internal promotion.

Observers of the apprenticeship system suggested that recently external applicants have been recruited only as a way to increase the number of female or minority applicants as part of affirmative action programs.

As part of the training system there is no corporate wide formal planning concerning long term skill needs or training requirements nor do any company wide "skills inventories" exist for the blue collar workforce. This contrasts with an information system which exists within GM that tracks white collar employees and is utilized to fill job openings by identifying employees with particular skills. Any planning that does occur regarding blue collar skill availability or needs is at that plant level and tends to be short term in response to the introduction or shortly-planned introduction of new machinery. For

instance, the introduction of programmable controllers in the mid-1970's required new training for electricians. (Electricians had to learn how to perform "re-wiring" of the panel logic through re-programming rather than the traditional method of stringing new wires). As this new equipment was brought into various plants management initiated in-house training for the existing electricians. Much of this training was conducted by salaried engineers on the plant staff. Eventually, exposure to programmable controllers was included in the apprenticeship program for electricians.

Adjustment to skill needs occurs at the local level through a number of routes. In-house training as described above is utilized as a frequent device for skill acquisition when new technologies are put into place on the shop floor. Management can also utilize employees-in-training as temporary tradesmen to respond to short run shortages in qualified skilled tradesmen. In addition, management can, and did so frequently in boom periods in the 1950's, 1960's and 1970's, recruit qualified journeyman tradesmen from the external labor market. The presence of journeymen in supplier shops, and the relatively high wage paid by the major producers made available this form of adjustment.

As described in more detail in the case study, training at the plant level typically is budgeted in a "variable" account within each plant's operating budget. As a variable activity, training budgets are set as a percentage of total operating budgets. Consequently, the level of training activities varies directly along with the volume of production. This approach does not view skill acquisition as a fixed asset and can be criticized on the grounds that it takes a short run approach to training. In the division analyzed in the case study, as of

1982, apprentice training was shifted to a partially "fixed" account in an attempt to have training respond to longer term corporate needs.

Later, we discuss the implications of new contract clauses introduced in the 1982 agreements at Ford and GM. Prior to the introduction of those changes, the training system described above had not undergone fundamental revision over the last twenty years except for issues concerning technological change. Incremental changes and changes in implementation had occurred periodically in the personnel system but, in general, the system was stable.

The major exception to overall stability within the training system was the introduction of a "Statement on Technological Progress" included in the 1976 agreements at Ford and GM which was then elaborated in the 1979 agreements.^{6/} This statement committed the companies to rely on existing UAW-represented employees as a workforce for any new technologies with the following language,:

"It is recognized that advances in technology may alter, modify or otherwise change the job responsibility of represented employees at plant locations and that a change in the means, methods or process of performing a function including the introduction of computers or other new or advanced technology will not serve to shift the work function from represented to non-represented employees."^{7/}

In addition, the companies pledged to devote resources to the training of the existing workforce so as to facilitate the in-house retention of work associated with new technologies.

In effect, the Statement on Technological Progress limits management's ability to utilize either sub-contracting, outsourcing, or the shift of work to white collar staff as part of the introduction of new technologies. The language of the statement is loosely structured and does not provide iron clad guarantees that new technology necessarily

will be utilized by existing UAW-represented workers. Yet, the general intent of the statement is clear and disputes regarding the interpretation of the clause are subject to the grievance procedure. And, field interviews do suggest that in some cases this statement has induced management to rely on existing workers rather than utilize external manpower sources as might have occurred otherwise when new technology has become available.

III. Recent Changes in Personnel Planning

In the face of enormous declines in employment and poor long term employment prospects, the personnel planning system within the U.S. auto industry has undergone a number of significant recent modifications. These changes have been encouraged by new contractual clauses introduced in the 1982 agreements at Ford and GM, and by the worker participation programs underway across the industry. This section reviews both the pressures for change within the labor relations system and the implications for personnel planning and training.

A prolonged recession combined with a rise in imports and structural shifts in the demand for automobiles have produced enormous declines in auto sales and employment. The employment of production workers in the motor vehicles industry (SIC 371) has dropped from a peak of 802,800 in December 1978 to 511,500 as of July 1982.^{8/} Furthermore, most analysts contend that although auto sales are likely to undergo a modest recovery and return to the 1978 level by 1990, employment prospects are much gloomier. After reviewing long term macro economic forecasts, the Transportation Systems Center of the U.S. Department of

Transportation projects that with necessary productivity improvements, even if sales return to their earlier peak levels, by 1990 employment will not be above its low 1982 level.^{9/}

A. Employment Development and Training Program

In response to the large layoffs, gloomy forecasts, and as part of a package which included significant compensation concessions, the contracts reached at GM and Ford in March 1982 introduced a number of new programs which affect personnel planning and training. One of those programs is the creation of a joint labor-management "National Employee Development and Training Program" at each company funded by company contributions.^{10/} One of the objectives of these programs is to provide retraining and counseling to laid off workers who will never return to the auto industry.

At Ford, management has committed 5¢ per worker hour towards this program. As part of the program a National Vocational Retraining Assistance Plan has been introduced which provides laid off auto workers up to \$1,000 per year for four years in tuition assistance. As well, the Ford National Training Center has initiated counseling and employment service programs within a number of local labor markets often in association with existing public agencies such as the State Employment Service or federally funded CETA training programs.

The Ford National Training Center has also initiated targeted "Vocational Retraining Projects" which provide re-training that might allow laid off production workers to find skilled or semi-skilled work within either the auto industry or some other industry. Plans also have been started for a permanent career counseling and guidance service that

would operate at the plant level. These latter two programs differ from the Vocational Assistance Plan both because they could entail continued employment in the auto industry for the worker involved, and because they would continue and expand in future years even if there is no longer a pool of permanently laid off auto workers.

At GM, the 1982 contract established two training funds, one generated by a 5¢ per hour contribution and another funded by a 10¢ per hour contribution. The 5¢ per hour fund will be used exclusively for permanently laid off workers. The 10¢ per hour fund, which likely will generate \$190 million over the term of the agreement, will fund classroom and on-the-job training for employed auto workers. It has been estimated that the new training funds can provide three times the amount of training employees typically received in the recent past. The exact details regarding the use of either the 5¢ or 10¢ per hour funds have not yet been finalized at GM.

These Employee Development and Training Programs are extremely novel and have far reaching implications. For one thing, the creation of these programs signals labor and management's admission that there is now a large number of laid off auto workers who will never return to employment in the auto industry. Thus, the program entails a commitment by the companies to retrain workers who likely will not be a part of their own workforce and thereby, has these companies assume a responsibility that heretofore had been viewed as a responsibility of government and not of the private sector. There is no similar major private sector effort at retraining and relocation underway in the U.S.

In the long run the interrelationship between the training funds and counseling services within the new program, and the existing apprenticeship system will have to be resolved. For, in many ways their

jurisdictions overlap. The training programs also inter-relate with other parts of the national contracts. One way to view the new programs is to perceive them as a funding device for the retraining the companies committed themselves to once they agreed to the "Statement on Technological Progress" which pledged that existing manpower would be relied on to utilize new technologies.

B. Guaranteed Income Stream

Another innovation in the 1982 agreements at Ford and GM which has major implications for personnel planning is the Guaranteed Income Stream (GIS) Benefit.^{11/} This program provides that permanently laid off workers with more than 15 years seniority receive 50% of their last years earning (an additional 1% for each year of seniority beyond 15 up to 75% of last years pay) until reaching normal retirement age. At that point normal pension and Social Security benefits will provide income support. This benefit enormously increases the penalty the companies pay for any such permanent layoff and for plant closings. Consequently, management has a strong incentive to adjust personnel planning, manpower utilization and hiring so as to avoid such costs. In effect, this program has increased the fixed costs associated with employing an additional worker. (Within Ford, as of March 1983, 100 workers have qualified for the GIS benefit).

One of the immediate effects of the GIS program is that it has induced greater efforts at long term personnel planning at GM. There, the labor relations department has begun to study likely long term GIS costs and methods that might limit the layoffs that initiate these costs. In this way, the GIS benefit program has provided a push for the

sort of long term personnel planning for blue collar workers which previously did not exist within the auto industry.

C. Pilot Employment Guarantees

The 1982 national agreements also included a novel effort to experiment with employment guarantees at select plants (four plants at GM and three at Ford).^{12/} Within these plants 80% of the existing workforce are guaranteed employment during the term of the agreement (until September 1984). The presumption was that this guarantee would be renewed in the future, and that labor and management at the pilot plants would renegotiate their local agreements so as to facilitate the guarantees. It is the latter which have significant implications for the personnel planning system. For, in order to guarantee employment, presumably the personnel system would have to provide a significantly greater degree of flexibility so as to allow manpower reallocation in the face of inevitable downturns and flux in production volumes. The more these experiments were to spread to other sites, the greater would be the necessity of more flexible personnel rules since the companies would increasingly lose the option of using other sites and operations as a buffer to shield sites with employment guarantees from volume flux.

Negotiations began this past summer (1982) at a number of the pilot employment guarantee sites concerning the new local plant agreements that will accompany the employment guarantee. So far, only one plant (Ford-Chicago Assembly) has even reached a tentative agreement, and that agreement was recently turned down by the local UAW membership by a vote of 1740 to 453.^{13/}

The tentative agreement reached at the Chicago Assembly plant included: changes in overtime procedures and overtime equalization

rules; increased use of temporary part-time workers; consolidation of several job classifications; experimental use of worksharing in the event of volume reductions; new contract language regarding transfer rights; the establishment of a joint committee to examine production standards; and the selective screening and dismissal of laid off employees based on their prior discipline and absentee records. At this point in time both all the features of the tentative agreement and the reasons for the members dissatisfaction are not clear. However, early reports suggest that the UAW members who voted against the proposed agreement were particularly upset about the selective screening of laid off workers, and feared that inclusion of this procedure would eventually lead to the elimination of seniority rights and their associated protection. It remains to be seen whether labor and management are finally able to agree on amended local contracts at the pilot employment guarantee sites and the actual terms of any new agreements.

D. Plant Closing Moratorium and Outsourcing Agreement

The 1982 agreements at Ford and GM also included a promise by management not to close any plants for 24 months "as a result of outsourcing the components manufactured in the facility."^{14/} Although, plant closings would be permitted for volume-related reasons or as a consequence of internal company consolidations of operations. The companies also pledged to try to maintain existing employment levels and employ their best efforts to replace jobs which may be lost by outsourcing.^{15/} Both of these promises put further pressure on the companies to engage in more extensive personnel planning and develop policies that lead to fuller utilization of the existing workforce. In

effect, both policies raise the costs (direct and procedural) to relying on the external labor market for either recruitment or displacement.

E. Worker Participation Programs

In response to the severe economic pressure of massive layoffs, and as part of a strategy to improve competitiveness through cooperative solutions, worker participation programs have expanded significantly within the auto industry over the last three years. These programs include formal programs which provide workers with involvement in production decision-making at the shop floor level via quality circles, and at the corporate and plant level through so-called mutual growth forums where labor and management discuss competitive pressures and business decisions. In addition, workers and union officials have begun to receive information regarding new technologies, business plans, extensive supplier relations, and personnel policies through direct communication with management outside of traditional collective bargaining channels. The net effect of these programs and their associated exchange of information is to move labor and management towards a relationship that relies less on formal and contractual rule making, and more on decentralized and flexible procedures.^{16/}

The fact that extensions in worker participation have arisen hand in hand with the new contractual agreements discussed above is not surprising. As, in many ways the efforts to rely more heavily on internal promotion and personnel planning, and worker involvement in decision-making are reinforcing activities. For instance, by committing to utilize the existing workforce, management allays workers' fears that either technological changes or the lower costs which arise through participatory efforts would lead to worker displacement.

The worker participation programs interact with personnel planning in other ways as well. For example, work rule changes adopted in a number of plants have introduced broader job classifications. Machine operators are now doing more minor machine maintenance, while assembly workers have added inspection and housekeeping duties to their jobs.

Sometimes this job broadening comes about explicitly as part of the adoption of "universal" production classifications and operating teams. In select departments a few Ford plants have introduced a universal classification scheme which eliminates the detailed production worker classification system. Meanwhile, full scale adoption of operating teams has occurred at a handful of GM plants. These operating teams and universal classification systems typically function in association with a "pay for knowledge" scheme which rewards production workers explicitly for learning to perform a variety of jobs. In some other cases, production worker skill upgrading has been associated with the introduction of statistical quality control techniques which provide on-line assessment of machine performance. The latter necessitates that workers receive classroom training in statistical and computer methods, and typically has the production worker assume some inspection job functions.

Classification broadening requires that workers learn a more diverse set of tasks either informally on the job or through more formal instruction. In this way, classification broadening has led to significant changes in training practices. One of the other effects of classification broadening is an increase in the number of production workers holding semi-skilled jobs lying between the trades classifications and the traditional operator classification.

In some plants, including the Division described in the case study, "project estimating groups" have been created. In these groups workers participate in bidding on work such as new tooling, work that can be brought into or kept in a plant. This bidding process includes discussion of work rule changes and work reorganizations that are needed to lower in-house production costs to the level of alternative supplier prices. In some instances these estimating groups are closely associated with quality circles and other worker participation programs. Changes in work organization that arise in job bidding have implications for classification definitions and thereby, for the training process.

Worker participation programs also have led to increased worker involvement in the design of training programs. In one plant the master electrician has assumed responsibility for the design of a new craft training program, a responsibility traditionally held by managerial staff. This switch is an outgrowth of the wide ranging informal consultation occurring between labor and management within this plant.

Even in the face of these changes, it should be remembered that the U.S. personnel planning system remains heavily formal and contractually based. Furthermore, as the case study which follows illustrates, the training system is focused on satisfying short term needs and only recently has made some movement toward concern for long term skill development and adjustment.

Footnotes for Sections 1-3

1. "Seniority," Paragraphs 56-75, Agreement Between General Motors Corporation and the UAW, March 21, 1982.
2. "Supplementary Unemployment Benefits Plan," Exhibit C, Ibid.
3. "Memorandum of Understanding on Overtime," Ibid., p. 186.
4. "Skilled Trades," Paragraphs 119-183, Ibid.
5. Paragraph 127(d)(1), Ibid.
6. "Statement on Technological Progress," Ibid., pp. 430-433.
7. Ibid., p. 431.
8. These employment figures are from Employment and Earnings, Bureau of Labor Statistics, U.S. Department of Labor, various years.
9. Unpublished report, Transportation Systems Center, U.S. Department of Transportation.
10. The term Employee Development and Training Program is used in the Ford-UAW agreement. At GM, the phrase "Joint Skill Development and Training Program" is used. See pp. 282-283 for a description of the program and pp. 424-426 for funding details, 1982 GM-UAW Agreement, op. cit.
11. "Guaranteed Income Stream Benefit Program," Exhibit E, Ibid.
12. Pilot Employment Guarantee Project," Document No. 29, Ibid., pp. 265-266.
13. Daily Labor Report, Bureau of National Affairs, March 21, 1983, No. 55, pp. A-14 and 15.
14. "Outsourcing--Moratorium on Plant Closings," Document No. 91, Ibid., p. 395.
15. "Sourcing," Document No. 93, Ibid., pp. 399-403.
16. The broad implications of the worker participation programs are discussed more fully in, "The U.S. Automobile Collective Bargaining System in Transition," Harry C. Katz, manuscript, Sloan School of Management, M.I.T., January 1983.

IV. Case Example

This case deals with changing human resource management policies at one division in General Motors. Specifically, it examines the effect of these policies on a reduction-in-force (RIF) in the number of skilled trades apprentices and journeymen which took place at the Division's mid-Michigan location.

The case which follows provides:

- a) an overview of the operations and characteristics of the Division which relate to the skilled trades,
- b) definitions of skilled trades functions, management techniques, and training methods,
- c) a description of the circumstances, alternatives, and resolution of the layoff conflict,
- d) an analysis of the rational behind the resolution from both union and management perspectives, and
- e) a comparison of the training policies and procedures of this Division with others in the Corporation.

A. Background and Overview

This division of GM produces component parts for automobiles, trucks, farm machinery and aircraft. The division has plant locations in the U.S. and overseas, with a major manufacturing complex located in mid-Michigan. Peak domestic employment for the Division occurred in the mid-1970's with over 13,000 blue-collar, and over 2,000 white-collar employees. By 1981, employment had been reduced to under 6400 blue-collar and 1800 white-collar workers.

The products which the Division manufactured are not (as a rule) highly technical in nature; however, the Division has been in the forefront of manufacturing technology. Innovations such as LASER hardening, computerized parts matching at assembly, and metal forming improvements were brought into mass production operations at the Division. These highly technical processes require a machine maintenance workforce which is highly competent at both "traditional" industrial maintenance, and maintenance of the new manufacturing technologies. In the future, other advanced technologies such as computer numerical control (CNC), integrated flexible automation (robots) and expanded use of programmable controllers will require further enhancement of the skills of the craft workforce in this division.

As previously mentioned, there is sharp differentiation between skilled and production job classifications. This differentiation is also reflected in the management organization in the division. Figure 1 shows the organization of the Division as related to the skilled trades. Each plant functions in a nearly autonomous manner with respect to changes in workforce and assignments of employees. A plant typically has from 800 - 1200 blue-collar employees in total.

The craft worker reports to an assigned foreman, who is often a "former" craft worker. These foremen report to the skilled trades general foreman for their plant. The skilled trades general foreman is the top manager of the crafts, and reports to the plant manager. There is no collective hierarchy for the skilled trades management across the division which differs from other manufacturing managerial structures in the Corporation. This feature produces trade-offs between coordination of skilled trades policy across the division, and autonomy in the allocation of individual plant resources.

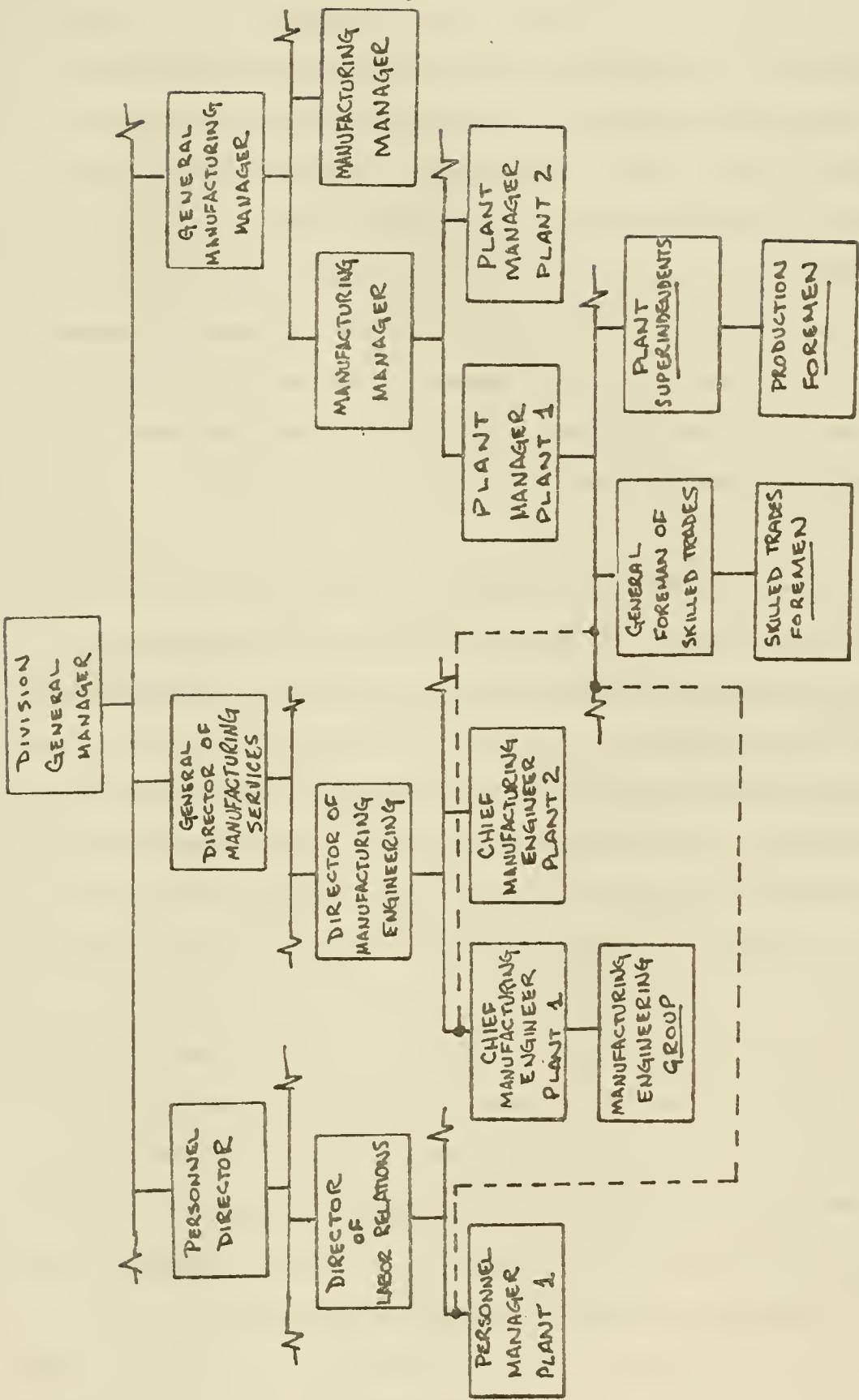


FIGURE 1 - PARTIAL ORGANIZATIONAL CHART OF DIVISIONAL OPERATIONS

In order to provide the necessary coordination across the Division, the general foremen in the mid-Michigan location began to meet in 1978 as a group (once per week) to discuss common problems, strategies, and future requirements. Topics include labor relations strategies such as lines of demarcation, policy problems such as inter-plant "bumping" of tradesmen, and training programs such as in-plant training and apprentices. Each general foreman is responsible for the performance and the training of the trades in his plant with the exception of the apprentice program. This program is administered by the Division's Labor Relations Department because it is a UAW-GM negotiated program in GM.

B. Skilled Trades Function, Management, and Training

The skilled trades at the Division are made up of traditional facilities maintenance, machine maintenance, and tooling fabrication trades. Their major functions are:

1. Maintain production equipment on an as-required basis, as in the case of breakdowns. This entails most "downtime" type maintenance of the equipment and is made at the request of the production department. This type of work comprised twenty percent of the skilled trades work in 1981.
2. Check and maintain production equipment on a periodic basis to prevent unplanned loss of machine up-time. This entails periodic checks and replacement of machine components, and non-operator service to equipment such as oiling. This type of work (known as PM for planned maintenance) comprised eight percent of the skilled trades work in 1981 and is scheduled by a maintenance engineer in the plant.

3. Perform "project work" such as plant re-arrangements, machine design changes, and tooling fabrication. These projects may be large re-arrangements or simple machine changes such as installing a light at a workstation. This type of work made up the remaining seventy-two percent of the 1981 trades workload, and is scheduled by a maintenance planner in each plant.

The blue-collar workers in the skilled trades departments are made up of four broad classifications. First, journeymen are craft workers who have completed an "approved" apprenticeship program, or who have shown evidence of at least eight years of full time work within their trade. They are highly skilled in their craft and perform skilled work within the plant.

Second, apprentices are workers who are currently active in the apprentice program at the Division. This program involves a full-time work phase of three and one-half years, along with a concurrent schooling phase of 576 classroom hours. Completion of both the classroom phase and the work hours phase results in attainment of journeyman status. During at least one-half of the work phase, apprentices work alongside journeymen as learners to acquire skill and proficiency on the job. Classroom time is spent in theory and lab practice of the trade, along with basic math and science training.

Third, Employees-In-Training (EIT's) are employees who have demonstrated proficiency in skilled trades work, but who lack either proof of trade experience, or a valid journeyman certificate. These employees are allowed to function as learners for the amount of time which it takes to become a journeyman (less than or equal to eight years on the job). These employees supplement the journeyman workforce immediately as they normally have significant practical experience in the trade. They are not bound by

the apprentice program rules concerning classroom hours as the EIT program is handled at the local level.

Last, semi-skilled and unskilled employees are those involved in routine machine maintenance such as oiling. They provide necessary, lesser skilled maintenance to plant and equipment.

Planning and budget systems at the Division constitute the main quantitative tools for the skilled trades management. Planning of skilled trades workload for periodic and project type work is based on a simple computerized job modeling system. This system uses worker-hours, availability of parts and material, and timing constraints to produce manpower requirement and loading forecasts into the future.

Budgeting of skilled trades work takes two forms. First, plant expense accounts are established to accrue operating expenses for the plant. Operating expenses such as normal maintenance of plant and equipment are "charged" to these. These accounts effect the profit and loss for the plant and are carefully watched by the managers. Second, major rearrangements and retooling are charged to appropriations which are received from the Corporation. Examples include the re-tooling for product line changes such as the all new domestic models of the last five years. Budgets are set at the beginning of the year, and are calculated as a given percentage of the direct (productive) labor which is used in the plant.

Another procedure which is pertinent to training concerns the method by which the Division acquires a technically competent crafts workforce. By 1980, it was perceived by management that the level of training in the Division and throughout GM was inadequate, and the Corporation had to increase its commitment to the training of its employes so as to enable them to handle emerging technologies.^{1/} The two methods which were used to

meet this goal were to bring new journeymen into the expanding workforce who were trained or trainable in the new technologies, and to retrain the existing workforce.

To expand the number of tradesmen, the human resource strategy at the Division traditionally had been to develop journeymen internally, rather than recruit actively from other area employers. The mid-Michigan area is heavily dominated by GM and by auto industry suppliers. The stripping of workers from suppliers was not thought of very highly by management as it created ill will among area employers, many of whom were GM suppliers. Within the Division, both the apprentice program and the EIT methods were used to train employees or new hires to become journeymen, although the preferred method was through the apprenticeship system.

To retrain the existing workforce in response to the introduction of new technologies, two methods are used. The first is in-plant classes on new technology soon to enter the plant. The example of programmable controllers cited earlier is one where the existing workforce was retrained in the new technology. The second method consists of on-the-job training with the vendor representative. This method has been used only as a last resort, since only a few tradesmen can participate in the training.

Budgets for training were handled on a plant-by-plant basis. The payment for all training was made out of the plant operating budget accounts. This included all of the hours which an apprentice spent at work, and meant that these learners were "charged" to the plant at the same rate as a journeyman and to the same accounts. Training seminars by vendors were also charged to plant expense, so that all training funds except tuition for the apprentices was an expense on the plant operating budget, and was subject to fluctuations in the production schedules.

The rapid pace of technological change and the lack of up-to-date training within a significant portion of the existing workforce led the skilled trades management to recognize the importance of the apprentice program. The skilled trades general foremen as a group worked to expand the use of the apprentice program to train employees whenever possible, to discourage the use of EIT's where an apprentice program existed, and to improve both the classroom and in-plant curricula within the apprentice program. They also recognized that existing journeymen needed to update their own skills since many had been in the trade for years and not much retraining had been occurring.

C. 1981 Skilled Trades Layoff

During the fall of 1981, the automobile industry in the U.S. was feeling the full effects of a deep recession and heightened international competition. Employment was down to the point that some plants in the division had laid off over forty percent of the production employees due to lack of work and changing product mix. The cut in production had not effected the skilled trades up to that point in time because only twenty-eight percent of the skilled trades work was production dependent. The remaining seventy-two percent was project rearrangement and retooling as part of GM's forty billion dollar capital investment program. By the fall of 1981, much of the changeover for the 1983 model year was complete, and some programs for 1984 and beyond had been pushed back or postponed indefinitely. This abrupt loss of work for the skilled trades resulted in the decision to lay off over one hundred skilled tradesmen.

The dilemma facing the skilled trades managers at that time was the method of achieving the reduction in force (RIF). The immediate problem was the fate of the apprentices who were still in the training program at that time.

The traditional solution had been to achieve the RIF by first reducing all apprentices and "non-seniority EIT's" (generally less than four years of training) out of the trades.^{2/} This had been done on other occasions since 1970. (The actual layoff of skilled tradesmen had occurred only once in recent history in this Division, in the 1974 recession.) This RIF method meant that these employees were removed from in-plant training and sent back to former production jobs if they could hold seniority in other departments in the plant. Most apprentices are low seniority (less than five years) workers who are often not able to hold production seniority, i.e. they would be laid off. The second group to be cutback was seniority EIT's (if any exist), followed last by journeymen. This sequence, if vigorous enough, would eliminate the apprentice class for a given trade and produce the loss of those employees with the most up to date training (albeit low experience) due to layoff.

The potential use of this procedure caused great concern to the general foremen because of its long term effect on the apprentice program, and the Division's ability to function in the future for five reasons:

1. The talented younger apprentices might be lost permanently as they sought work elsewhere, possibly out of the area. This meant starting a new apprentice from the beginning while losing a valuable employee.

2. The apprentice classroom work was taught at the local community college. Scheduling the classes had presented difficulty in the past and an elimination of the program, as had occurred in the past, might meet with opposition from the schools. If forced to terminate the classes, the school would be more reluctant to restart the program in the future.
3. The skills which the apprentice learned were state of the art for the plant. This was one of the mechanisms used to impart new knowledge to the journeyman workforce. The major mechanism (in-house training as described above) was expensive and often inferior, as hands on time was usually limited for the journeyman. The apprentice, on the other hand, had time to spend in labs to better learn how to maintain the machinery.
4. The general foremen saw many good workers in the 1981 group of apprentices. In many cases, they would have preferred to keep these employees rather than some other tradesmen. This was less a determining factor in the end, but it did provide impetus to the investigation of alternatives to the traditional layoff approach.
5. The general foremen saw the apprentice program as the best method of providing future trained craftsmen. They judged that the program should not be subject to cyclical flux as it had in the past. This situation provided a good opportunity to change the precedent of reducing apprentices during low ebbs in the business cycle. Seventy-five percent of the apprentices were, in fact, very close to having completed the training program. Some were only a few months away from program completion.

These factors illustrate the changing focus of the Division's human resource policy, as increased emphasis is being placed on the generation of a well-trained and highly motivated workforce for the future. The skilled trades managers recognized this need, and made the judgement that the apprentice program should provide the majority of the new tradesmen. This judgement followed from several factors including the short supply of a skilled labor pool in the area. Outside hiring also was deemed to be undesirable because new hires often came in with "bad" habits, and because a policy of robbing from other local facilities was politically taboo. They realized, however, that the scheduled production and corporate policies would not allow them to hang on to employees who did not have sufficient work.

The problem was how to effect the RIF without losing the apprentices, many of whom had less than one year to complete their training program. This task had to be accomplished without alienating the remainder of the workforce, within the confines of the contract, and preferably with the cooperation of the union local.

As mentioned, the traditional method of accomplishing the RIF was not satisfactory to the skilled trades managers. Additionally, the union was not in favor of losing the apprentice class. This was due to several circumstances surrounding this particular set of apprentices. First, many of the apprentices had very little time left before they would graduate to journeyman status. Second, during prior years some outside hiring of journeymen had been done by the Division mostly from the area GM hiring pool and the local union preferred to rely on apprentices since many of them came from the ranks of union represented production workers. Third, the removal of the apprentice program (which a large reduction would cause) was

"distasteful" to the union local hierarchy, as some of them were tradesmen and had long standing loyalty to the continuation of the program.

The skilled trades managers conferred with the Divisional Labor Relations Department regarding how best to address the problem. These managers indicated that they strongly supported the apprentice program, and that they did not favor utilizing traditional layoff practices. With these criteria, two options were proposed.

First, the GM-UAW National Agreement stipulates that maximum ratios of apprentices to journeymen must be maintained (1:8), as stated earlier.^{3/} The mid-Michigan plants were well below the critical value, so they could lay off in the journeyman seniority group without violating the contract. This was possible because journeymen were in a different seniority group than apprentices within the plant's local seniority agreement. (This is typical of auto plant agreements.)

However, this method had some serious shortcomings. Even though the contract did not specifically recognize journeymen's seniority "rights" over apprentices, it has long been an argument of the Corporation that experienced workers are more desirable than inexperienced ones. That is one of the rational bases for the seniority system in the first place from both union and management perspectives.^{4/} In the national collective bargaining agreement, the Corporation also had agreed to a "Statement on Technological Progress" which pledged that training would be provided as new technologies emerged. The union could have argued that the layoff of journeymen was a method which reduced the number of trained employees and also increased the use of "cheaper" apprentice labor.^{5/}

The second alternative which the Labor Relations Department suggested was to use the seniority rules for apprentices to maximal advantage in this particular case. This hinged on four key circumstances which were present at that time:

1. The Division had hired journeymen from the outside in the previous four years as a result of internal workload requirements, and the availability of craftsmen in the area labor pool. These tradesmen therefore had low divisional trades seniority.
2. The skilled trades seniority rules as applied to the apprentice program stipulates that upon graduation, the trades "date of entry" is set to the beginning of the apprentice program.^{6/}
3. Most apprentices were near (less than one year) to completing the program. If a layoff occurred as in the past, they could not finish the program until they were rehired and placed back in the program.
4. The local union was sympathetic to both the apprentice program, and the issue of "equity" for apprentices nearing the end of training.

The alternative then was to allow apprentices to stay in the program, if they would be able to hold seniority upon graduation with all of the current journeymen, and if they were "reasonably" close to graduating. This implied that some journeymen could be laid off, while an apprentice in the same trade was kept, if the journeyman's divisional "date of entry" was after the date on which the apprentice had entered the apprentice program.

This latter alternative was chosen as the plan to offer to the union,

because it best satisfied the criteria set out by the general foremen and the Labor Relations staff. The plan was submitted to the management of each respective plant, and approval was given to approach the union with the proposed scheme. The Labor Relations staff acted as the company spokesman in presenting the proposal informally to the president of the UAW local for the plants. A verbal agreement was reached at a subsequent meeting. The union agreed that it was more equitable to allow the "short term" apprentices to finish where possible, in lieu of keeping an employee with less divisional skilled trades seniority.

The initial and subsequent layoffs followed the new policy and led to the layoff of nine journeymen while causing the retention of nine apprentices in those trades. In addition, because of volume reductions many apprentices and journeymen in other trades were laid off. The population of tradesmen in the mid-Michigan location are shown for one year later in Figure 2.

	Journeymen (All Trades)	Apprentices - Total and (< 1 year to completion)
NOV 1981	1449	98 (74)
NOV 1982	1283	2 (0)

Figure 2 - Skilled Trades Employment mid-Michigan

D. Analysis

A comparison of the methods for setting skilled trades layoffs in 1981 with the pre-1981 procedure gives an indication of the overall change in human resources management policy in the organization. Prior to 1981, the methodology for all layoffs (skilled and non-skilled) was dictated by strict adherence to credited seniority. Recommendations on the size of a reduction in the skilled trades were made by each general foreman to his/her plant manager based on the foreman's intuition and prior experience. The decision on how many crafts department workers to reduce was then passed back to the general foreman by the plant manager, based on the overall plant budget constraints (not necessarily the needs of the plant for maintenance, or the general foreman's recommendation). The cuts in personnel were usually larger than recommended, and the general foreman had little recourse but to implement the cuts. S/He had neither data nor other resources with which to dissuade the plant manager.

Beginning in 1978, the general foremen began to meet as a group. This interaction facilitated an exchange of information and strategy regarding all facets of their function. The group also met bi-monthly with the plant managers and made common proposals with uniform and sound justifications to improve the skilled trades functions. Formal decision-making power soon began to pass to this group, as the plant managers became aware of the usefulness and responsibility of the group. Functions such as inter-plant "bumping" and labor relations for the crafts were turned over to this group. By 1981, most policy decisions were made by the general foreman group, or by

the bi-monthly combined group.

The general foreman group was very aware of the importance of the increasing complexity of the manufacturing processes which the Division used. They were also aware of the capabilities of the existing workforce, and the critical need for additional trained employees in the future as a larger percentage of the workforce became "indirect - skilled" type labor. Much of the early work of the group was devoted to improving the methods of training employees in the skilled trades. The previously mentioned programmable controller training became part of the electrician apprentice curricula because of the urging of the foremen's group. In early 1981, a substantial revision of the apprentice program was underway also at the instigation of this group. The foremen's clear preference for the apprentice program as the primary means of acquiring new tradesmen is seen in their insistence not to use EIT's, where an apprentice program was in place.

The foremen group also recognized the need to provide additional training to the existing journeyman who were not familiar with the state-of-the-art. Several in-plant training programs were conducted as new technology entered the plant. Although this training was reactive (machines using the new technology were soon to enter the plant), it showed their concern with maintaining a competent workforce, within the bounds of budget constraints.

Finally, the group recognized that even with in-plant training, many of the existing tradesmen were not learning the new skills. This occurred because of lack of hands-on time to use the skills, lack of enthusiasm of the employee to learn new skills, and lack of adequate time and funds with which to conduct the training. These problems underscored the need for the younger (future) workforce to be capable and available to enter the changing

workplace environment.

The increased authority of the general foreman group, and their concern for the future performance of the skilled trades allowed the group to propose the change in policy. The RIF policy was a compromise between the need to maintain a stable workforce, and a younger one which could function in the new technical environment of the future.

The results of the change in policy were not spectacular in a numerical sense. Of the over one hundred employees who were laid off, only nine were journeymen who would otherwise have stayed. From the skilled trades management point of view, the overall scale of recession induced layoffs had essentially removed the apprentice program from the plant. Those employees who were attending classes at the local college were allowed to finish the semester, and many continued to attend classes while laid off. Yet, the goal of keeping the apprentice program active even in the face of layoffs clearly was not reached.

From the point of view of the union, a long standing equity problem was addressed in part by the new policy. An equity problem had also existed whenever employees who were nearing the completion of a long training process were laid off, and the new policy resolved this problem. Those apprentices who are very near finishing will be allowed under some circumstances to complete their training. However, the union continued to face a dilemma regarding how it could equally represent all employees. The journeymen who were to be laid off because of the new policy are members of the same local union as the apprentices and other more senior journeymen. Yet, they were laid off in lieu of non-journeymen who had considerably less experience in the trade. The new policy agreed to by their representatives was not in their own best interests. These journeymen may have perceived

that the local was favoring longer time members of the local, over them. Yet, even in the face of these problems the rudiments of the solution were initially proposed by the union in preliminary discussions. This was the case in spite of the fact that the president of the local was a tradesman.

For the employees then, the results appear mixed. On one hand, the new agreement does recognize the special nature of training programs, and especially the apprentice program. On the other hand, the clear signal which the laid off journeymen have received is the overriding concern of the management and the union to protect employees who have been with the company for some time. The laid off journeymen will not likely stay in the area to await recall, since they have highly marketable skills even in the midst of the recent economic downturn.

The human resource philosophy which was employed in this case was directed toward two major goals. First, there was an attempt by both union and management to keep the apprentice program intact. This involved the use of some creative bargaining on behalf of both sides in order to assure that the national and local agreements were not violated. Second, the parties tried to find a mutually satisfying solution which corrected some of the inequities of prior situations. Both parties acknowledged that serious inequities had transpired using the previous layoff formula, and both worked towards a successful conclusion of the problem. This indicates a heightened sense of cooperation on the part of both labor and management, which may be a result of economic conditions, and an awareness of the needs of the skilled trades. It is noteworthy that the president of the local was not in office at the time of the prior layoff of journeymen, nor was the general foreman group in existence at that time.

The fact that the agreement was verbal shows the caution which both parties chose to exercise. This undertaking presented a new direction in policy, and the verbal agreement involved the implementation of this new policy. The change in direction may not yet be complete, so any restrictions that might have been caused by a written agreement have been avoided by both sides. Should a similar situation occur in the future, some leeway is still possible in future negotiations.

The agreement may have implications for future policy in three areas:

1. The new policy signals the recognition of training programs as unique entities that must be given special consideration in all skilled trades policies,
2. There is a new spirit of cooperation and prior consultation between union and management on matters of concern in the skilled trades, and
3. There may be a spillover of these policies and relations into non-training and non-skilled trades areas.

The first of these implications became apparent concurrent to the layoff situation. The 1983 model year budget (set in the first months of 1982) contained a separate accounting system for the apprentice program which, although not totally divested of ties to production schedules, was derived separately. The budget amount was based on the general foreman projections of monies required, rather than on past history of production. There are also several programs being proposed which will further segregate training functions from fluctuations in the production schedules. These are being developed at the instigation of the general foremen, and include long term planning and funding of training tied to new technology introduction. One proposal is to include the training for tradesmen required by a new technology into the capital purchase funding for the equipment. In this

way, new technology projects would fund necessary training.

The cooperation which was demonstrated between labor and management may well expand as a consequence of some new individual arrangements. For example, a subcommittee of the previously mentioned bi-monthly plant manager/general foreman group includes blue collar representatives from the skilled trades. This subcommittee is concerned with the apprentice program and changes which each trade must make to address changing technology. The union apprentice coordinator and several tradesmen are members of this committee.

With respect to non-training spillover, there is strong evidence that the QWL process and the cooperative spirit is at work in other skilled trades functions. The starting point for the tooling estimating groups mentioned earlier was a labor-management confrontation concerning efforts to alter the work rules so as to improve productivity. However, these QWL type groups of tradesmen now determine the best way to make tooling in-house, and thereby determine the inside cost of manufacturing. The groups, although not promoted by the union, are well staffed and functional.

E. Comparison of Corporate Training Systems

General Motors' organizational structure allows a great deal of autonomy to division level management to structure internal programs. Additionally, the UAW-GM national agreement allows significant autonomy in the actual design of training programs at the local level. These freedoms have combined to produce significant diversity in the skilled trades planning, and training systems at each division. In this section, we will contrast the training process within three divisions within the corporation. The differences across these three divisions are indicative of the variation

in philosophy and policy within GM. The three divisions are the components division described earlier in this case, a "car" division which includes parts manufacturing and car assembly operations, and a fabricating division, all of which are located in mid-Michigan. Three facets of the training process in each division will be contrasted. Then, preliminary judgements of the significance of these variations will be provided. The three facets are:

1. Management systems in place for the skilled trades, specifically general planning and budget mechanisms,
2. Training philosophy and structures which are used to achieve and maintain a competent skilled trades workforce, and
3. Upper management "commitment" to training in the skilled trades.

The components division described earlier in the case does not have a long term manpower planning system for the skilled trades. However, it does have a highly sophisticated short term system in place. This workload planning system provides the skilled trades management with a good quantitative picture of manpower staffing requirements for the skilled trades. This system has allowed staffing levels to be controlled within very close proximity of actual workload during a time of significant flux (capital expenditure installations coupled with declining production schedules). The budget system, described in more detail earlier, is marked by a close tie to production schedules and capital expenditures. The tie to production consists of a budget allotment based on the number of production hours which were worked in the month. This ratio is established each year at the start of the model year. Training budgets, as described, are partly divest of this ratio, but are still subject to gross changes in production requirements (they are "semi-variable").

The training system for the crafts consists of apprentice programs for most trades, and in-plant training on new technology which takes place in a reactive mode. That is, training is done in anticipation of delivery of equipment which incorporates new technology. Some basic or pro-active training is done, but most of this is part of the apprentice program, and is not available to existing journeymen. Training for production workers has been implemented in areas such as statistical process control, and machine specific training for unique equipment.

The commitment of upper management to training is characterized by the reactive mode of training which is used in the Division. No formal declaration of commitment to retraining for the skilled trades has been made; rather, traditional rhetoric regarding providing workers with the tools to do their job is the current policy.

The fabricating division, has neither a long term nor short term workload planning system for the skilled trades. Consequently, much confusion exists when production schedules change radically, or "project" work becomes important. Budgets for the trades are set based on the standard GM accounting system of variable allocations based on productive labor (as with the components division). However, in this division training budgets for new technology training are completely segregated from plant maintenance expense. These costs are borne by the division, thereby alleviating the concern of operating management that training expenditures will affect plant operating profits. This procedure is in effect division-wide for all new technical training. Apprentices are still accounted for in the same manner as journeymen, and therefore are affected by changes in production schedules.

For technical training, this division uses advanced computer-based, self-paced learning systems, in addition to hands on lab exercises. They have on-site facilities designated as training rooms which house the labs and computer learning centers. These facilities are used by tradesmen on all shifts, and extra tradesmen are kept on the payroll in order that each employee has access to the facility on company time. The program is administered by the skilled trades management at each plant, with the aid of an engineering support staff. Training is a combination of pro-active basic technology training, and reactive training for current technological needs.

The commitment of upper management to training can be seen from the expenditures on training facilities and associated staffing. This division is scheduled for high levels of automation in the near future, and has made a strong commitment to the training of craft employees via the computer-based system.

The car division does not have a long term workload planning system. They have a simple short term planning system which is not capable of producing good quantitative manpower forecasts. Training budgets for the trades are tied to production schedules, but as with the fabrication division new technical training is segregated from plant maintenance expense.

This division has a very large technical training staff which develops and conducts training for the skilled trades. Classroom, computer-based, and lab training is all provided to the Division's plants from a central training facility, housed in two small buildings on a main manufacturing complex. The staff is a separate department, and as such "sells" its services to each plant. This autonomy allows the staff to operate more freely than a plant staff, with fewer constraints in the area of production

staffing and plant operating problems. Training ranges from basic skills, through new technology with emphasis on future needs in the trades. This training is both pro-active and reactive. There is much emphasis placed on providing at least minimal levels of competence in basic craft skills.

The upper management at this division has made a serious commitment to new technical training. The formation of the centralized "training center" group, and the significant staff and funding of the center show the high degree of importance placed on new technical training in the division.

Differences in the process within the three divisions emerged as a consequence of differences in planning procedures and managerial philosophy. In the area of planning, we observe the unusual result that divisions which more closely monitor staff levels, end up with less long term training. Divisions which have less sophisticated personnel planning have had less difficulty in implementing skilled trades training because of the availability of deliberate overstaffing. Discussions at the car and fabrication divisons indicate that managers there overstaff in order to provide training, but that they do not know exactly how much overstaffing occurs since they do not know what the "proper" level of staffing is. The components division, on the other hand, has the ability to forecast workload very closely, and thus managers are held to planned staffing levels and do not have excess manpower available to respond to long term training needs.

The implications of upper management commitment for training also are illustrated by the contrasts in the divisions. The car division has the most explicit commitment by management to training, including the mandate to develop training programs for the trades. The fabrication plants have a less explicit commitment, but a positive one none the less. They are free to use funds to purchase and use training aids, to set aside floor space for

facilities, and to assign tradesmen to training during the work day. The components division has no less of a need for technical training (as we have indicated), but the commitment has not been made by upper management. The skilled trades managers in this division are required then, to provide training in a reactive mode to respond to the short term needs of the plant.

Footnotes

1. "Statement on Technological Progress," Agreement between General Motors Corporation and the UAW, September 14, 1979.
2. "Skilled Trades," Paragraphs 152-180, Ibid.
3. "Skilled Trades," Paragraph 140, Ibid.
4. "Inverse Seniority," Position paper submitted by General Motors to UAW Seniority Subcommittee, 8/13/76.
5. Apprentices earn as much as \$2.50 less per hour than journeymen in the same trade when they start in the program. Wages are indexed upward with experience so that by the end of the apprentice program, the employee is at the journeyman wage rate.
6. "Agreement - Skilled Trades," Paragraph 137b, Op.Cit.

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